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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
LAROSE, COLIN M	
ART UNIT	**PAPER NUMBER**
2623	

DATE MAILED: 06/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/444,034	PATTIKONDA ET AL.	
	Examiner	Art Unit	
	Colin M. LaRose	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 April 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7,17-27 and 29-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *29-41* is/are allowed.

6)☒ Claim(s) *7 and 17-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Arguments and Amendments

1. Applicants' amendments and arguments filed 2 April 2004, have been entered and made of record.

Claim Objections

2. In response to Applicant's amendments, the previous objections under 37 CFR 1.75 have been withdrawn.

Response to Amendments and Arguments

3. Applicant's arguments with respect to claims 17 and 25 have been fully considered but they are not persuasive for at least the following reasons.

4. Applicant has amended claim 25 to denote that a plurality of lines are utilized. However, Goshorn discloses this feature: figure 1 shows two separate lasers (20 and 22), each emitting a laser beam (line) of light (53 and 54) onto the object surface.

5. Applicant has amended claim 17 to denote that the first line is narrow, and Applicant has pointed out that Goshorn discloses "wide" lasers. Examiner agrees that Goshorn's laser beams 53 and 54 are wide so that they "extend transversely across substantially the entire width of the printed circuit board" (column 4, lines 31-39).

However, Goshorn's laser beams are very narrow in the transverse dimension. Goshorn states that an area imaged over the reflected beams is approximately 8x512 pixels, or about 0.007 inches wide (column 6, line 60 through column 7, line 5). Therefore, Goshorn's laser beams 53 and 54 can be characterized as long and narrow lines of light.

Claim Objections

6. Claim 26 is objected to because of the following informalities:

"line" should be -- lines --.

Appropriate correction is required.

7. The following sections of 37 CFR §1.75(a) and (d)(1) are the basis of the following objection:

> (a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.
>
> (d)(1) The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

8. Claims 29-41 are objected to under 37 CFR §1.75(a) and (d)(1) as failing to particularly point out and distinctly claim the subject matter that the applicant regards as the invention.

Regarding claim 40, "in the region" has no antecedent basis.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 17-20 and 25-27 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,495,337 by Goshorn et al. ("Goshorn").

Regarding claim 25, Goshorn discloses a method of inspecting a structure-bearing surface of an object, said method comprising the steps of:

forming a plurality of lines on the surface of the object using a light emitted at a first wavelength (column 5, lines 54-60: lines 53 and 54 formed by projectors 20 and 22 at some wavelength of light);

moving the lines with respect to the surface (column 5, lines 43-50: laser projectors are moved across the surface);

capturing the image of the lines as the line moves with respect to the surface (column 5, lines 50-53: camera 23-30 record the reflected beam images); and

determining height information for structures from the image of the lines (column 6, lines 9-13: height, H_{SS}, is determined).

Regarding claim 26, Goshorn teaches the line is created by a coherent light source that emits light strobed at a predetermined exposure time (column 5, lines 50-53: laser light is strobed).

Regarding claim 27, Goshorn discloses the lines are formed in a spaced relationship on the surface of the object (figures 2a and 2b: beams 53 and 54 are formed spaced apart on the object).

Regarding claim 17, Goshorn discloses an optical inspection system (figure 1) for inspecting a structure-bearing surface of an object, said system comprising:

at least one coherent light source (projector 20) that illuminates the surface of the object with a narrow coherent light creating a first narrow line (i.e. coherent lines of light 53), said at least one coherent source being movably mounted (i.e. stage 11 moves via motor 40) such that the first line created by the at least one coherent light beam can be moved over an area of interest on the surface of the object;

a camera movably mounted (column 4, lines 56-60: cameras 23-30 are included in the stage) above the surface for capturing an image of the first narrow line as it moves with respect to the surface being inspected;

means for moving the camera and the at least one coherent light with respect to the surface being inspected (cameras 23-30 and beam projectors 20, 22 are mounted on the stage 11, which moves over the surface of the object);

wherein the at least one coherent light source is strobed (column 5, lines 50-53: projector 20 is strobed) at a first predetermined exposure time, thereby controlling exposure time of the camera to the illumination created by the at least one coherent light source (column 12, lines 25-36: lasers are strobed at predetermined intervals, which determines the exposure timing from the cameras 23-30); and

a computer (processors 21A-21H, column 5, lines 22-27) that determines height information for the structure from the captured image of the first narrow line.

Regarding claim 18, Goshorn teaches the coherent light source is a laser (column 5, line 27: "laser beam projectors").

Regarding claim 19, Goshorn discloses a first visible light source (projector 22) for illuminating the surface of the object (with beam 54), wherein the camera captures a first image of the surface when it is illuminated by the first visible light source (column 7, lines 21-25) and the computer determines two-dimensional structure information from the first image (column 7, lines 36-45 and figure 2b: a base distance B_{SR} is calculated by the processors 21A-21H based on at least one of the eight images of the surface containing the reflected beam 54).

Regarding claim 20, Goshorn discloses the first visible light source (projector 22) is operable to strobe (column 5, lines 50-53: projector 22 is strobed) at a second predetermined exposure time, thereby controlling the exposure time of the camera to illumination from the first visible light source (column 12, lines 25-36: lasers are strobed at predetermined intervals, which determines the exposure timing from the cameras 23-30).

Claim Rejections - 35 USC § 103

11. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

12. Claims 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goshorn and U.S. Patent 6,064,478 by Paul et al. ("Paul").

Regarding claim 21, Goshorn discloses illuminating the surface of the object with a visible light (laser 54 from projector 22, figure 1). However, Goshorn is silent to the visible light being at a second wavelength that is different from the first wavelength (for laser 53 from projector 20).

Paul discloses an inspection system (figure 1), which utilizes a plurality of light sources (L1, L2) to inspect an article that is moving with respect to the light sources, similar to that of Goshorn. In particular, Paul discloses that the light sources L1 and L2 are of different colors (i.e. wavelengths). Column 3, lines 51-53.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Goshorn by Paul so that Goshorn's "light" and "visible light" are at different wavelengths, since Paul teaches that utilizing different wavelengths permits surface defects to be easily recognized as changes in color (column 4, lines 4-8).

Regarding claim 22, Paul discloses the camera (i.e. RGB camera) comprises a first channel for capturing light at the first wavelength (e.g. red) and a second channel for capturing light at a second wavelength (e.g. blue).

Regarding claims 23, the combination of Goshorn and Paul teaches illuminating the surface with light at a third wavelength, the third wavelength being different from the first and second wavelength (Paul, figure 4: three light sources, each emitting different wavelengths of light) wherein the image-capturing step includes capturing a third image (e.g. image from camera "C3", figure 3) created by the visible light at the third wavelength, and determining two-dimensional information for any structures in the region by analyzing the third image (column 7, lines 36-45 and figure 2b: a base distance B_{SR} is calculated by the processors 21A-21H based on

the images of the surface containing the third light source; Goshorn discloses using eight cameras, as shown in figure 3, and the images from all of the cameras are used in determining 2-D information).

Regarding claim 24, Paul discloses the camera (figure 1) comprises a third channel for capturing light at a third wavelength (e.g. green).

13. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Goshorn and Sayag.

Regarding claim 7, although Goshorn is silent to the computer including means for integrating the height information over the length of an exposure to calculate average height, this limitation is a common feature of imaging devices that were known at the time the invention was made.

Sayag provides a general background of the functionality of semiconductor imaging devices, such as CCDs. Sayag teaches that CCDs capture images, inter alia, by accumulating charges during an integration (exposure) period, and the amount of charge accumulated provides a measure of the average radiant energy (column 1, lines 37-40). Therefore, information pertaining to height (e.g. beams 53 impinging on object 12 in figure 1 of Goshorn) is average values due to the integration performed by the CCD during the exposure intervals.

Allowable Subject Matter

14. Claims 29-41 are allowed.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (703) 306-3489. The examiner can normally be reached Monday through Thursday from 8:00 to 5:30. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au, can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (703) 306-0377.

CML

Group Art Unit 2623

21 June 2004

AMELIA M. AU
SUPERVISORY PATENT EXAMINER
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